7. (i) Prove by induction that, for all positive integers n,

$$\sum_{r=1}^{n} \frac{1}{r(r+1)} = \frac{n}{n+1}$$

(5)

(ii) Prove by induction that, for all positive integers n,

$$f(n) = 3^{2n+4} - 2^{2n}$$

is divisible by 5

(5)